International Journal of Agricultural Science and Research (IJASR)
ISSN(P): 2250-0057; ISSN(E): 2321-0087
Vol. 9, Issue 3, Jun 2019, 173-178

TRANS STELLAR
•Journal Publications •Research Consultancy

EFFECTIVENESS OF CROP DOCTOR MOBILE APPLICATION IN CHANGE OF KNOWLEDGE ON PLANT PROTECTION AMONG FARMERS

JANARTHANAN. R[1], M. SENTHILKUMAR[2] & M. RAMASUBRAMANIAN[3]

[1]*Student, Department of Agriculture Extension and Rural Sociology, TNAU, Coimbatore, Tamil Nadu, India*

[2]*Assistant Professor, Directorate of Extension Education, TNAU, Coimbatore, Tamil Nadu, India*

[3]*Associate Professor, Krishi Vigyan Kendra, Nedamanaglam, Tamil Nadu, India*

ABSTRACT

The information technology revolution has given a new vista for utilizing transfer of technology tools in agriculture. The Expert System is one such potential transfer of technology tool which solves the problems in agriculture that requires human expertise. The web based expert system has been released by various national and international institutes. For ease of use by farming community, it has been now released as mobile application for smart phone. A research study was conducted in Tamil Nadu, India, to study the effectiveness of crop doctor component of Paddy Expert System, mobile application, released by Tamil Nadu Agricultural University. The study was conducted among the selected paddy farmers who had smart phone possession. The findings revealed that there was an increase in diagnostic knowledge of the respondents. Majority of the respondents had gained knowledge on identification of secondary symptom. The knowledge gain was influenced by the attitude toward Information and Communication Technology based extension service, mobile application operational ability, and trainings undergone related to Information and communication technology.

KEYWORDS: Mobile Application, Expert System, Paddy, Information and Communication Technology & Plant Protection

Received: Mar 22, 2019; **Accepted:** Apr 12, 2019; **Published:** May 09, 2019; **Paper Id.:** IJASRJUN201927

Original Article

INTRODUCTION

Farmers diagnose the crop damage by pest and disease through ancestral knowledge, experience. Most of the farmers depend on private agro input dealers for crop advisory. Rice crop requires continuous monitoring for pest and disease. It is affected by pest and disease in all stages starting from nursery to harvest (MoFAW, 2019). Rice crop dominates the Indian pesticide market, the farmers have been exploited with non –judicious/spurious pesticide. **(**Tata strategic management group, 2018**).** Expert system is an artificial intelligence based tool that works on the principle of it and then rules to solve the problems that require human expertise. Realizing its potential web based expert system for rice has been developed by the International Rice Research Institute (IRRI, "Rice Doctor"). In India, Indian Institute of Rice Research, Hyderabad. National Rice Research Institute, Cuttack and other stake holders have jointly released diagnostic tool in Rice knowledge management portal for public use.(Rice Knowledge Management Portal, "Rice diagnostic tool"). Many engineering projects has been tested in developing novel expert system for diagnosis of rice pest and disease(Abdullah, S 2016). Due to the advent of Smartphone mobile usage among farmers Government of India, Ministry of Agriculture and Farmers welfare realizing the potential for transfer of technology through smart phone has released a number of mobile applications for farmers. i.e., Kissan Suvidha,

Krishi Vigyan Kendra Mobile application etc., now the expert system are converted to mobile application as a nexus for transfer of technology tool. Pioneer institutes like National Rice Research Institute, Tamil Nadu Agricultural University have released mobile app expert system for rice in Google play store. These applications have been released in trilingual and bilingual for farmer's ease of use. In which TNAU Paddy Expert system – Tamil application has alone been downloaded more than five thousand times. (TNAU, "Paddy Expert System Tamil - Apps on Google Play", 2017). Availability of content, connectivity and access of information to farmers has rapidly increased with the growth of smart phone usage among the farmers. Hence there is a need to study the effectiveness of mobile application for agro advisory.. Keeping in this view the present study was conducted with the specific objective to know the effectiveness of the crop doctor component in, Paddy Expert system Mobile application of TNAU, in terms of knowledge gain and also know the factors influencing knowledge gain through crop doctor.

METHODOLOGY

The present study was conducted among the paddy farmers who possessed smartphone in paddy growing districts of Tamil Nadu viz., *Villupuram, Kancheepuram* and *Thiruvarur* during 2018. A sample size of 153 respondents were derived using the purposive sampling technique with the help of *Krishi Vigyan Kendra* in the respective districts, and the Department of Agriculture, Tamil Nadu. A teacher made knowledge test was constructed with the help of extension scientists. The items were finalized by listing the items and subjected to rank by the experts in terms of economic damage and its prevalence. The selected respondents will have to undergo pre and post knowledge test and they were facilitated to diagnose the symptom through crop doctor component for the selected symptoms. Data were collected using pre -tested semi structured interview schedule and a teacher made knowledge test, appropriate scientific tools were implemented to measure the effect of independent variables towards the knowledge gain. The data were analysed using appropriate statistical tools including percentage analysis, cumulative frequency method, and 'paired t test' multiple linear regression analysis and Pearson's correlation coefficient.

RESULTS AND DISCUSSIONS

The knowledge level of the respondents before and after the exposure was measured to find the knowledge gained through exposure of the crop doctor component. 'Paired t test' was applied to find out the significance in the pre and post exposure scores.

Table 1: Knowledge Enhancement of Respondents After Exposure to Crop Doctor

(n=153)

S. No.	Name of the ICT Component	Knowledge Before Exposure (%)	Knowledge Immediately After Exposure (%)	Mean Knowledge Gain (%)	Percentage of Knowledge Gain
1	Crop Doctor mobile application	65.54	87.20	20.95	13.6

The Table 1 depicting the overall knowledge gain of the respondents show that there was mean knowledge gain by about 20.95 per cent among the respondents immediately after exposure. There was increase in knowledge by 13.6 per cent among all the participants in terms of percentage. 'Paired t test' results proved that significance level was less than 0.05 which clearly indicates there is a significance between the knowledge level of the respondents during pre and post exposure stage. It is inferred that there is a significance in the knowledge gain among the respondents. These findings are in line with Karpusamay 2015 and Ponnusamy 2016.

It is clear from the Table 3 that the selected respondents had higher prior knowledge on the identification of stem borer pest of 63.39 per cent. The reasons might be due to the higher prevalence of stem borer infestation throughout the crop season and by ancestry knowledge. Peer –peer communication among the fellow farmers might be also had influenced the prior knowledge.

Only 14.37 per cent knowledge prevailed among the respondents for the control of blast disease through bio control agent. it might be due to the reason the respondents awareness on bio control agents and its benefit are less realized and the farmers tend to prefer chemical control agents due to the immediate availability and also the influence of local agro input dealers. Highest percentage increase 63.40 was noted for identification of secondary symptom. The reason for this might be due to the exposure to crop doctor guidelines and facilitation

Table 2: ltem Wise Respondent's Knowledge Before and After Exposure to Crop Doctor

(n=153)

S. No.	Name of the Item	Before Exposure (%)	After Exposure (%)	Percentage Increase
Diagnostic knowledge				
1	Knowledge on Identification of Primary symptom	33.33	90.19	56.86
2	Knowledge on Identification of Secondary symptom	23.52	86.92	63.40
Identification and Management knowledge on pest and disease				
3	Identification of stem borer	63.39	90.84	27.45
4	Bio control management practice for stem borer	15.03	50.98	35.95
5	Identification of brown spot	43.13	80.39	37.26
6	Bio control Management practice for brown spot	16.99	67.32	50.33
7	Identification of all stages of blast	30.06	77.12	47.06
8	Management practice for blast	14.37	67.32	52.95
9	Identification of brown plant hopper	58.82	88.23	29.41
10	Agronomic management practice for brown plant hopper	26.14	75.16	49.02
Preventive plant protection practices				
11	Knowledge on Seed treatment	19.60	68.62	49.02
12	Knowledge on pheromone trap	37.90	69.93	32.03

Multiple regression analysis helps to find the causes behind an effect in this study it was used to find the factors influencing the knowledge gain.

Table 3: Relationship Between the Independent Variable and Knowledge Gain of the Respondents

(n=153)

S. No.	Variables	'r value'	regression coefficient (b)	SE	'p' value	t value
1	Age (X1)	0.184^{**}	-0.008	.039	.831	$-.209^{NS}$
2	Educational status(X2)	0.421*	0.037	.030	.350	1.219^{NS}
3	Area under paddy cultivation (X3)	-0.110^{NS}	-0.087	.059	.227	-1.467^{NS}
4	Experience in paddy cultivation (X4)	-0.165^{**}	-0.026	.039	.283	$-.652^{NS}$
5	Mobile application operational ability (X5)	0.610^{*}	0.380	.051	.000	5.493*
6	Information seeking behaviour (X6)	0.436^{*}	0.074	.061	.937	1.357^{NS}
7	Trainings undergone in ICT (X7)	0.032^{*}	-0.086	0.099	0.002	0.899*
8	Innovativeness (X8)	$.030^{NS}$	-0.031	.064	.585	$-.477^{NS}$
9	Awareness on Agricultural mobile application (X9)	$.381^{**}$	0.373	.184	.632	1.967^{NS}
10	Utilization of agricultural mobile application (X10)	$.428^{*}$	-0.248	.190	.892	-1.253^{NS}
11	Attitude towards based extension services (X11)	$.744^{*}$	0.480	.065	.000	6.977*
12	Extent of use mobile phone (X12)	$.411^{*}$	0.239	.095	.150	2.600^{NS}
13	Progressiveness (X13)	$.379^{*}$	0.000	.062	.359	$-.015^{NS}$

Note: R^2 Value = 70.50 ** Significant at one per cent level of probability,
*significant at five per cent level of probability
^{NS} – Non significant

F value = 11.413

Multiple regression analysis was applied to find out the influence of the independent variable to the knowledge gain among the respondents. The R^2 value was 0.705

The R^2 value has shown that all the variables contributed 70.50 per cent variation in knowledge gain in plant protection among the respondents.

Therefore, the equation was worked out and given below.

$$Y_1 = -0.447 - 0.008 (X_1) + 0.037(X_2) -0.087 (X_3) - 0.026 (X_4) + 0.380 (X_5) +0.074 (X_6) + 0.086 (X_7) - 0.031 (X_8) + 0.373 (X_9) – 0.248 (X_{10}) + 0.480 (X_{11}) – 0.239 (X_{12}) + 0.000 (X_{13})$$

The results indicated the variables viz. Mobile application operational ability, Attitude towards Information and communication technology based extension service have shown positive contribution at five per cent level of probability. The remaining variables did not contribute to knowledge gain among the respondents. Results revealed that five unit increase in the following independent variable viz., Mobile application operational ability (X5), Trainings undergone in Information and Communication technology(X7) Attitude towards ICT based extension service (X11), had increased the knowledge level by 5.493, 0.899 and 6.977 units respectively.

Mobile application operational ability had a significant contribution at five per cent level for knowledge gain, the respondents were able to easily navigate through the crop doctor and this might be the reason for the contribution of mobile application operational ability. Attitude towards Information communication technology based extension had a significant contribution to knowledge gain at five per cent level of probability, the reason for the contribution might be due to that the respondents were having a higher attitude towards Information and communication technology based extension services this is fact has made the psychological acceptance of Information and communication based transfer of technology tools for their farm and this might be the reason for contribution.

Training's undergone related to Information and communication technology had significant influence on the knowledge gained. It is obvious that trainings will facilitate the farmers in acquiring knowledge and skill. This might be due to the reason for knowledge gain among the respondents. it is notable that majority of the farmers were non participants in the training due to the recent introduction of mobile application for agriculture and the less awareness of mobile application among farmers.

CONCLUSIONS

From the results it is evident that availability of handy tool like mobile application based diagnostic tools will pave new way in the crop specific plant protection advisory. Tamil Nadu Agricultural University Paddy expert system component crop doctor will definitely be a new digital guide to disease diagnosis. From this study, it may be inferred that famers can be given orientation on handling of new information technology tools, and training can be specifically concentrated on the newly released mobile application. Hence the application in the vernacular language with user centred interface could be realised for higher productivity of agriculture. The application content in crop doctor should be validated and updated in time to time to ensure the right agro advisory.

REFERENCES

1. *Abdullah, S., Fitriayanshah, A., Petrou, M., & Razalan, M. (2016). A Portable Rice Disease Diagnosis Tool Based On Bi-Level Color Image Thresholding. Applied Engineering in Agriculture, 32(4), 295-310. doi:10.13031/aea.32.10868.*
2. *Karuppasamy, A., N. Sriram (2015). Effectiveness of Paddy Expert System in terms of knowledge gain, skill acquisition and symbolic adoption behaviour among the paddy growers of Thoothukudi District in South Tamil Nadu. International Journal, 1, 129-132.*
3. *Kumar, R., Hudda, R., Chahal, P., &Yadav, K. (2017). Availability of Information and Communication Technologies (ICTs) tools usages by Farmers in Haryana. Int. J. Pure App. Biosci, 5(3), 648-653.*
4. *Ministry of Agriculture and Farmers Welfare (MoFAW, 2019). Retrieved from*

   http://farmer.gov.in/imagedefault/pestanddiseasescrops/pestanddiseasesofrice.pdf.
5. *Ponnusamy, K., Sriram, N., Prabhukumar, S., Vadivel, E., Venkatachalam, R., & Mohan, B. (2016). Effectiveness of cattle and buffalo expert system in knowledge management among the farmers. Indian Journal of Animal Sciences, 86(5), 604-608.*
6. *Alou, I. N., van Asten, P. J., & Tenywa, M. M. (2014). Biophysical and Crop Management Gradients Limiting Yields of East African Highland Banana (Musa Spp. Aaa-Ea) Within Farms in Low Input Cropping Systems. International Journal of Agricultural Science and Research (IJASR), 4(3), 27-43.*
7. *Rice diagnostic tool 2019.(n.d.). Retrieved from http://www.rkmp.co.in/diagnostic-tools.*
8. *Rice Doctor 2019. (n.d.). Retrieved from http://www.knowledgebank.irri.org/decision-tools/rice-doctor.*
9. *Tata strategic management group. (n.d.). Doubling Farmers Income: Role of Crop protection chemicals and solution (pp. 1-48, Rep.).*
10. *TNAU paddy expert system (2019). Paddy Expert system. Retrieved from*

    https://play.google.com/store/apps/details?id=com.cdac.tnau_paddy_tamil.